

Serial No. 10/542,780  
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## REMARKS

Claims 1-14 are pending in this application. By this Amendment, claims 1, 7, 11 and 13 are amended.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

In the Advisory Action mailed April 17, 2007, the Examiner maintains the rejection of the pending claims under claims 1-3 and 6 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Yamamoto (U.S. Patent No. 6,064,079). Claims 4-5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto as applied to claim 1 above and further in view of Fukuda (JP 2003-115610). Claims 7-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto in view of Kaneyama (U.S. Patent Application Publication No. US 2002/0014632). Claims 11-14 are understood as standing rejected under 35 U.S.C. § 103(a) as unpatentable over Yamamoto, in view of Fukada.

The rejections are respectfully traversed in the following discussion.

### I. THE CLAIMED INVENTION

The invention of claim 1, for example, is directed to a group III-nitride-based compound semiconductor device, that includes a first p-layer and a second p-layer, the first p-layer and the second p-layer including an acceptor impurity, and an intermediate layer provided between the first p-layer and the second p-layer, the intermediate layer contacting a surface of the first p-layer and a surface of the second p-layer. The intermediate layer includes a donor impurity at a concentration distribution that is based on activation rates of the acceptor and the donor impurities, such that at a specific temperature a compensation occurs to reduce a carrier concentration in said intermediate layer (Application at page 3, lines 4-15).

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This structure is important because by compensating for the concentration of the acceptor impurity, a hole concentration in the intermediate layer is substantially the same as that in a group III-nitride-based compound with no impurity added (Application at page 3, lines 16-25).

In a conventional group III-nitride-based semiconductor, as described in the Background of the present Application, the ability to withstand electrostatic voltages is far less than that of gallium-arsenic-based or an indium-phosphorous-based LED. Moreover, attempts to increase the ability to withstand electrostatic voltages have only resulted in a concomitant increase in resistivity and thickness (Application at page 1, line 14-page 2, line 18).

In contrast, an exemplary aspect of this invention is that of an improvement of the ability to withstand electrostatic voltages, as well as a reduction of driving voltage (Application at page 2, line 21-page 3, line 3).

## **II. THE 35 U.S.C. §112 REJECTION**

Claim 13 stands rejected under 35 U.S.C. §112, first paragraph, for allegedly failing to comply with the written description requirement. As claim 13 is amended in response to the rejection, withdrawal of the rejection is respectfully traversed.

## **III. THE PRIOR ART REJECTIONS**

### **A. The 35 U.S.C. §102(b) Yamamoto reference rejection**

In rejecting claims 1, 2, 3 and 6 under 35 U.S.C. §102(b), the Examiner alleges that Yamamoto et al. (Yamamoto) discloses or suggests each and every feature recited in the rejected claims. However, there are features of the rejected claims that are neither disclosed nor suggested by Yamamoto.

For example, Yamamoto fails to disclose or suggest and an intermediate layer provided between the first p-layer and the second p-layer, the intermediate layer contacting a surface of the first p-layer and a surface of the second p-layer, or, that the intermediate layer includes a donor impurity at a concentration distribution that is based on activation rates of

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the acceptor and the donor impurities, such that at a specific temperature a compensation occurs to reduce a carrier concentration in said intermediate layer.

It is alleged in the Office Action that Yamamoto discloses a gallium nitride-based compound semiconductor device that has a first p-layer 15 and a second p-layer 18 to which acceptor impurities are added. It is further alleged that Yamamoto discloses an intermediate layer 17, 34 provided between layers 15 and 18 (see Figs. 2A for example).

Even accepting *arguendo* that Yamamoto discloses the features as alleged in the Office Action, Yamamoto fails to disclose or suggest that an intermediate layer having the concentration distribution described in the independent claims or that the intermediate layer is provided between the first p-layer and the second p-layer, the intermediate layer contacting a surface of the first p-layer and a surface of the second p-layer.

For example, as shown in Fig. 2A, the alleged second p-layer is not disposed on a surface of the alleged intermediate layer 17, 34. Instead, none of the figures, or the accompanying text, disclose or suggest an embodiment wherein the alleged intermediate layer 17, 34 has the alleged first p-layer 15 and the alleged second p-layer 18 on a surface layer 17, 34.

Moreover, in an embodiment, Yamamoto further describes that the p-type modulation layer 34 is doped with Si and formed “inside the p-type low resistivity layer 16 in a manner to the open portion” (col. 5, lines 27-60).

The Examiner alleges that the current blocking layer 17 and the p-type modulation layer 34 correspond to the claimed intermediate layer. However, Yamamoto is silent regarding an intermediate layer (the current blocking layer 17 and the p-type modulation layer 34 of Yamamoto) that takes into account the activation rate of the dopants.

Instead, Yamamoto merely recites that the p-type modulation layer 34 contains a concentration of Si in addition to a predetermined concentration of Mg.

Thus, Yamamoto fails to disclose or suggest an intermediate layer provided between the first p-layer and the second p-layer or that the intermediate layer includes a donor impurity at a concentration distribution that is based on activation rates of the acceptor and the donor impurities.

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The Examiner appears to allege that the recited claim feature is a “product-by-process” (see page 3 of the Office Action, referring to “claim 35”). However, the rejected claim feature does not recite “product-by-process” language. A product-by-process claim is a product claim where the product is defined by its process of manufacture, especially in the chemical and pharmaceutical industries. Such claims may read, for instance, “*Product obtained by the process of claim ...*”. As no such language is recited in the rejected claim, the claim is not a “product-by-process” claim.

Rather, the independent claims describe a concentration distribution, which is a physical structural aspect of this layer.

Further, even accepting the Examiner’s argument *arguendo*, structure implied by process steps must be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product (MPEP 2113 citing *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979)).

As Yamamoto fails to disclose or suggest all of the features of the rejected claims, withdrawal of the rejection is respectfully requested.

**B. The 35 U.S.C. §103(a) Yamamoto and Fukuda reference rejection**

In rejecting claims 4, 5 and 11-14 under 35 U.S.C. §103(a), the Examiner alleges that the combination of Yamamoto and Fukuda (JP 2003-115610) discloses or suggests each and every feature recited in the rejected claims. Claims 4 and 5 are allowable for their dependency on independent claim 1 for the reasons discussed above, as well as for the additional features recited therein and claims 11-14 are similarly allowable.

The Examiner admits that Yamamoto fails to disclose the additional features recited in dependent claims 4 and 5. In an effort to overcome the admitted deficiency, the Examiner combines Fukuda for allegedly teaching such features.

However, as Fukuda fails to overcome the deficiencies of Yamamoto discussed above, the combination of references fails to disclose or suggest all of the features recited in the rejected claims.

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As Yamamoto fails to disclose or suggest the features of claims 4 and 5, withdrawal of the rejection is respectfully requested.

**C. The 35 U.S.C. §103(a) Yamamoto and Kaneyama reference rejection**

In rejecting claims 7-10 under 35 U.S.C. §103(a), the Examiner alleges that Yamamoto discloses all of the recited claim features except “that the p electrode comprises a thin film electrode and a thick film electrode.” In an effort to overcome the admitted deficiencies, the Examiner combines Kaneyama.

• However, as discussed above, Yamamoto fails to disclose or suggest an intermediate layer provided on a surface of the first p-layer and on a surface of the second p-layer or that the intermediate layer includes a donor impurity at a concentration distribution that is based on activation rates of the acceptor and the donor impurities.

Kaneyama discloses a group III nitride semiconductor device that includes p-type contact layer 109 disposed on a p-type clad layer 108. Kaneyama fails to disclose or suggest an intermediate layer on a surface of the p-type clad layer 108 and on a surface of the p-type contact layer 109, or concentrations of donor and acceptor impurities in such an intermediate layer.

As such, Kaneyama fails to overcome the deficiencies of Yamamoto and the combination of references fails to disclose or suggest each and every feature recited in the rejected claims.

Therefore, withdrawal of the rejection of claims 7-10 is respectfully requested.

**III. CONCLUSION**

In view of the foregoing, Applicants submits that claims 1-14, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

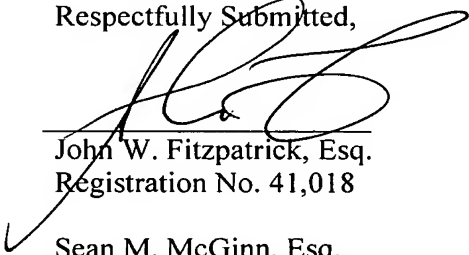
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Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Date: 5/8/02

Respectfully Submitted,

  
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